Introduction

• Red Meat Industry
• Thomas Foods International
• Production, Prices, Volume & Variation
• Adoption of Analytics
• SAS or Fools
David Rutley

- Lamb Supply Chain Coordinator
- 30 years Red Meat Industry production & research
- Consumer Appeal, Retail, Food Service, Distribution, Processing, Finishing, Production, Genetics
- Thomas Foods – Quantify and Connect the Supply Chain
  Signals from the Consumer to the Producer
Red Meat Industry

• Unsophisticated traders

• Buyers and sellers negotiate the spot price

• Accountants check profit daily to monitor & control prices & production

• Little to no prediction

• Lots of use of Excel, so I report in Excel
Red Meat Industry

- Largest Ag industry in Australia

Including flow on effects
- $23 Billion p.a.

- Employs > 134,000 people

- $8.7 Billion household income
Thomas Foods International

• Australia’s largest family owned red meat processor

• > $1.5 Billion p.a.

• 3 Plants Murray Bridge, Lobethal, Tamworth

• Domestic distributor, Holco

• USA distributor, TFI USA
Thomas Foods International

- ~25,000 sheep, lambs & goats & 1,100 cattle per day
- ~3.5 Million lambs p.a. 200,000 cattle p.a.
  ~1.5 Million sheep p.a.
- 15 - 20% of Australia’s sheep – largest processor
80% Lamb exported approx 8 - 10% global trade
Inside the Machine

Last 3 years

- ~10,000 different suppliers
- 25 different types of beef cattle
  - Organic, Angus, grass fed, grain fed, short, long & very long fed …
- New season’s lamb, lamb, hogget, mutton, goat
  - Organic, grass fed, grain fed …
Inside the Machine

- 1 lamb 25 kg carcass 20 kg saleable ~1.3 cartons
- 1 beef 280 kg carcass 200 kg saleable ~13 cartons

Deconstructing a black box
- Genotype by Environment = Variation
  CV HSCW = 15%
- >3,200 products
- 70+ countries
Product Sales – Murray Bridge

2014 Jul – 2016 Dec
• >3,200 different Products, 285,000 tonnes, 14.9 M cartons, $1.6 B

Show SAS Table of Carton Weights

Average Price for All Products

- Max Price $44.81/kg
- Min Price $0.67/kg
- 26% variance over 8 months
Supply Costs – Beef & Lamb – HIGLY Volatile
Somewhat Complex

• With this level of complexity and variation –

How do we know we are going to make a profit?

• Continual monitoring and controlling
  Little to no prediction

• Trial and Error & Experience
How do we know we are going to make a profit?

- Food is so important that it’s production MUST be viable over the long term.

- TFI’s beef processing probably did not make a profit at any stage in 2016 and for at least ½ of 2017.
The Future = Analytics

• Profit = Income – Expense

• Value = Profit – Risk

• Risk = Chance of a Loss

MUST understand RISK & therefore VARIATION

MUST develop Predictive Models
Beef – Predict Processing Yield

- 1 Beef Carcass
- > 50 possible pieces of meat
- > 230 possible cuts of meat, bone, trim, fat or waste

TFI Beef Yield Prediction Model based on

- Hot Standard Carcass Weight
- P8 Fat Depth
- Muscle Score
- Eye Muscle Area
- Days in Chiller

### The GLM Procedure

| Parameter     | Estimate  | Standard Error | t Value | Pr > |t| |
|---------------|-----------|----------------|---------|------|---|
| Intercept     | -1.645121137 | 0.64702639   | -2.54   | 0.0210 |
| DaysChill 1   | 0.386518672   | 0.16365032   | 2.36    | 0.0304 |
| DaysChill 3   | 0.260989542   | 0.17784901   | 1.47    | 0.1605 |
| DaysChill 4   | 0.000000000   | B             | 1.59    | <.0001 |
| HSCW          | 0.008089581   | 0.00069176   | 11.69   | <.0001 |
| P8            | -0.014824110  | 0.00704824   | -2.10   | 0.0506 |
| MusNo         | 0.068231071   | 0.03315580   | 2.06    | 0.0553 |
| EMA           | 0.013866075   | 0.00691995   | 2.00    | 0.0613 |
Beef – Predict Processing Yield

- Collecting data to relate sale price to cattle buying price
- 25 beef programs, 10 important programs

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<tr>
<th>Product</th>
<th>Product Description</th>
<th>Prodn Pcs</th>
<th>Net Wgt</th>
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<td>329</td>
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Price by Product Code from previous Table
Lamb Value Calculator – Predict Saleable Yield

• 1 Lamb Carcass
• > 36 possible pieces of meat
• > 92 possible cuts of meat, bone, trim, fat or waste

TFI Lamb Value Calculator based on

• Hot Standard Carcass Weight
• GR Fat Depth
• Days in Chiller
• Frequency of 4,536 different possible lamb carcasses
Lamb Value Calculator – Predict Saleable Yield

Effect of HSCW on Saleable Price

Saleable Price ($/kg HSCW)

Not 0

HSCW (kg)

Fatness Differences
Supplier Benchmarking – Rangers Valley Cattle Station

- Compare >2000 suppliers
- Value $20 per 400kg steer
- $750,000 per year
- Eliminated bottom 20% suppliers
Beef Eating Quality

• > 17 traits
• Have 1 minute to record 8 of these in the marshalling room.

Lamb Eating Quality

• 6 lambs/minute
• Cannot measure pH or Intra Muscular Fat (marbling) this fast

• Looking at hyperspectral imaging without cutting carcasses
  – 530 different wavelengths
Beef & Lamb Yield & Processing

DEXA
- Predict Lean Meat Yield
- Drive robots for automated processing
David Rutley – Biologist & Applied Statistician

Since 1984
• GLIMM, REG, Genstat, ASREML, S, SPSS, R & SAS (since 1994)

I have found SAS to be the most capable of
• handling Large & Complex data sets
• Robust, Repeatable & Verifiable analyses
PROPHESIS

Provided we understand Confidence & Prediction Limits

Good Prediction Better than Guessing

INVESTING vs GAMBLING

KNOWLEDGE